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$$(36 - 31.736) \div 2 = 2.132 \text{ in. thickness of shell.}$$

This problem was solved with same result, by Hon. Josiah H. Drummond, J. F. W. Scheffer, Frank Horn, J. K. Ellwood, and Cooper D. Schmitt.

39. Proposed by P. C. CULLEN, Superintendent of Schools, Brady, Nebraska.

A, B, and C start from same point at same time. A north at rate of three miles per hour, B east at rate of four miles and C west at rate of five miles per hour. B at end of two hours starts at such an angle as to intersect A. How long after starting must C start north-west in order to meet A and B at common point?

Solution by HON. JOSIAH H. DRUMMOND, LL. D., Portland, Maine, and J. W. WATSON, Middle Creek, Ohio.

Let x be the time after B turns till he meets A. The route of both is a right angle triangle with base 8; perpendicular $3x+6$, and hypotenuse $4x$. Hence, $16x^2 = (3x+6)^2 + 64$, whence $x = 7\frac{1}{7}$ or -2 . But the -2 value makes them turn back and meet at point of starting. Let y = time before C turns. Then $7\frac{1}{7} + 2 - y$ = time after he turns. $3x+6 = 1\frac{9}{7}^2$ = perpendicular, $5y$ = base, and $5(\frac{64}{49} - y)$ = hypotenuse. Hence, $25y^2 + (\frac{19}{7}^2)^2 = 25(\frac{64}{49} - y)^2$, whence $y = 2\frac{4}{7}\frac{2}{5}$ hours.

Excellent solutions of this problem were received from G. B. M. Zerr, P. S. Berg, J. K. Ellwood, Cooper D. Schmitt, and J. F. W. Scheffer.

40. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

Find the market-price of $m = 3\frac{1}{2}\%$ -stock, in order that it may yield $n = 3\frac{1}{4}\%$ interest after deducting $d = \$\frac{1}{20}$ from every $S = \$12$.

Solution by the PROPOSER.

According to the conditions of the problem, the deduction from the par (\$100) value of a share is $100d \times S$ dollars, = $\$3\frac{1}{2}$; therefore, $100(1-d \times S)$ dollars are to yield $\$m$ interest. In order to yield $\$n$ interest,

$$\text{the market-price must be } P = 100 \left(\frac{m}{n} \right) \left(1 - \frac{d}{S} \right) \text{ dollars, } = \$87\frac{1}{2}.$$

COR. — Put $m = n$; then $P = \$97\frac{1}{2}$, which is the correct result of this problem as proposed in the December, '94, MONTHLY.—F. P. M.

41. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

If I gain \$2 in \$5 by selling a horse for \$150, what per cent. would I gain by selling the horse for \$120?

Solution by P. S. BERG, Apple Creek, Ohio, and the PROPOSER.

Since gaining \$2 in \$5 is gaining 40%, the cost of the horse is \$107 $\frac{1}{2}$. Hence the gain required is 12%.

PROBLEMS.

46. Proposed by T. W. PALMER, Professor of Mathematics, University of Alabama.

A borrows \$500.00 from a Building and Loan Association and agrees to pay